

PA 400

OWNER'S MANUAL



The new PA-400 has all the features to handle the PA requirements of the most discriminating professionals, even in the largest areas. The versatility of the six channel mixer is augmented by the full complement of master controls, as well as, the brute 200 watt RMS power amp. Each channel of the PA-400 has two inputs with a unique switching arrangement that allows a wide range of inputs to be handled without overload. There is adequate gain built into each preamp to handle both low and high impedance microphones without the use of matching transformers. Each channel features separate volume, bass, and treble controls, as well as, an infinitely variable reverb mixing control. We feel that the infinitely variable reverb control is much better than the "in or out" action of the cheaper switch type controls. Jacks are provided for monitor amp/speaker systems and also for reverb cut-off remote footswitch.

The 200 watt RMS power amplifier (@ 1% THD) is more than adequate to power any speaker system and is able to cover most areas with tremendous sound pressure levels. The wide variety of speaker systems available with the PA-400 make it a most versatile and professional unit in every respect.

1. The effects/reverb send control is a new and unique solution to the problem of enabling variable signals to be fed to either the internal reverberation system or to the effects mixing bus for driving external effects or echo units. The Zero (center or 12 O'clock) position is the off setting. Clockwise rotation blends increasing signal levels into the internal reverb mixing bus system. The variation of signal is proportional to the degree of right rotation. This will allow selective blending of the signal from each channel to the effects/reverb systems. Counter-clockwise rotation of this control will send the channel signal to the effects mixing bus and will allow the output of each channel to be blended into a properly balanced signal for feeding external effects, monitor systems, or echo units.

2. The treble control determines the high frequency response of the individual channel. The treble control is part of an electronic crossover and functions as a volume control for the high frequencies. The vertical position (between 5 and 6) yields flat response, while clockwise settings boost highs and counter-clockwise settings yields a treble cut.

3. The bass control determines the low frequency response of the individual channel. The PA-400 bass control is a type of electronic crossover which acts as a volume control for the low frequencies. Because of the design of this control, it is possible to obtain both bass boost and cut. The vertical position (between 5 and 6) will yield a flat response. Clockwise operation results in a boost and counter-clockwise operation results in a cut.

4. The volume control serves to vary the gain of the preamp. The preamps of the new PA-400 are of the variable feedback type which allow lowest noise and maximum performance.

5, 6. Each channel of the PA-400 is equipped with two input jacks which are connected in a unique circuit that allows a wide range of inputs to be handled. When only one microphone is used, the "A" input jack is more sensitive than the "B" jack. This high and low gain feature enables optimum microphone matching. If a high output microphone is overloading the sensitive "A" input, simply re-connect this mike into the low gain "B" jack. When two inputs are used in each channel, the input circuit automatically balances to equalize the gain in both jacks.

This simple, but effective, switching system gives the user much greater flexibility in choice of input sensitivities and overload protection.

MASTER SECTION

The master control section includes controls for the overall adjustment of volume and reverb, as well as, master bass and treble for optimum frequency balance of the entire system. Our new and unique "scanning" anti-feedback control is able to eliminate feedback by actually sweeping the frequency spectrum and tuning out the frequencies feeding back—much the same as you would tune a radio. It is possible to "tune out" feedback by using either the high frequency filter, the low frequency, or both.

7. The master bass control is part of an electronic crossover and acts as an over-all level control for all bass frequencies. The action of this control is similar to the bass controls on the individual channels.

8. The Vital middle control seems to give best results in the flat or cut position (+ 0 to -10) for most applications. The effect of operating the middle control in the cut position is to give the extremes of bass and treble a boost relative to the Mid-range frequencies. Operation in this mode yields a very crisp and articulate sounding system.

9. The master treble control determines the over-all level of the treble frequencies, and its operation is similar to the individual channel treble controls.

10. The effects level control is the master gain control for the effects bus which is fed from the individual channel effects/reverb send controls.

11. The master reverb is the control that determines how much of the delayed (reverb) signal is blended back into the master mixer. The master reverb is a return level control and must be turned up before any reverb effect is heard at the output. The master reverb level should be set so that the individual reverb send controls on each of the channels have adequate control variation.

12. SCANNING FEEDBACK FILTER SYSTEM

Our newly developed anti-feedback system utilizes a novel circuit that actually allows the filter's center frequency to sweep up and down the audio spectrum to eliminate feedback nodes. In the past, fixed "notch" filters or the "graphic" equalizer were the only reasonable anti-feedback devices. The notch filter has fixed frequencies and a limited range while the graphic also has limitations such as fixed set of frequencies with boost or cut controls. Both the graphic and the notch filter are not capable of actually notching out the EXACT feedback frequency unless it happens to be the center point of one of its tuned circuits. Our new scan filter is able to actually vary its center frequency (notch) up and down to EXACTLY match the feedback node. Our field tests have revealed that two of these scan filters are necessary so that more than one node can be handled. We have made the filters to overlap to allow elimination of feedback caused by frequencies in the midrange that are often close together. This extremely simple but sophisticated system allows the operator to tune out the feedback as easily as tuning a radio. The tedious setup required with a graphic or the chancy situation with a notch filter is eliminated with our scan system.

Feedback can be eliminated by setting the system's tonal balance to suit the playing conditions, and bringing the volume level up to the point where feedback occurs. At the point of feedback, vary the low and high scan filters until the feedback ceases. The low scan should be tried first and if that alone is ineffective the high scan should be tried. It is best not to use the filters at all if possible since they do alter the sound very slightly due to their filtering action.

13. The master volume control controls the gain of the master mixer by use of variable negative feedback. The use of active mixing allows your PA-400 Mixer/Amplifier

to perform as well as many studio mixing consoles. This method is the same used on the latest recording mixers and yields the lowest distortion and noise of any other method. The master volume sets the level for the entire system and is set apart from the other controls by the size of its control knob. The master volume should be set approximately in the middle position (4-6), and fine adjustment in volume should be made with the individual controls on each channel.

14. The patching panel is provided to allow the operator to use the many facilities of these consoles in conjunction with external power amplifiers, other mixing consoles or effects units.

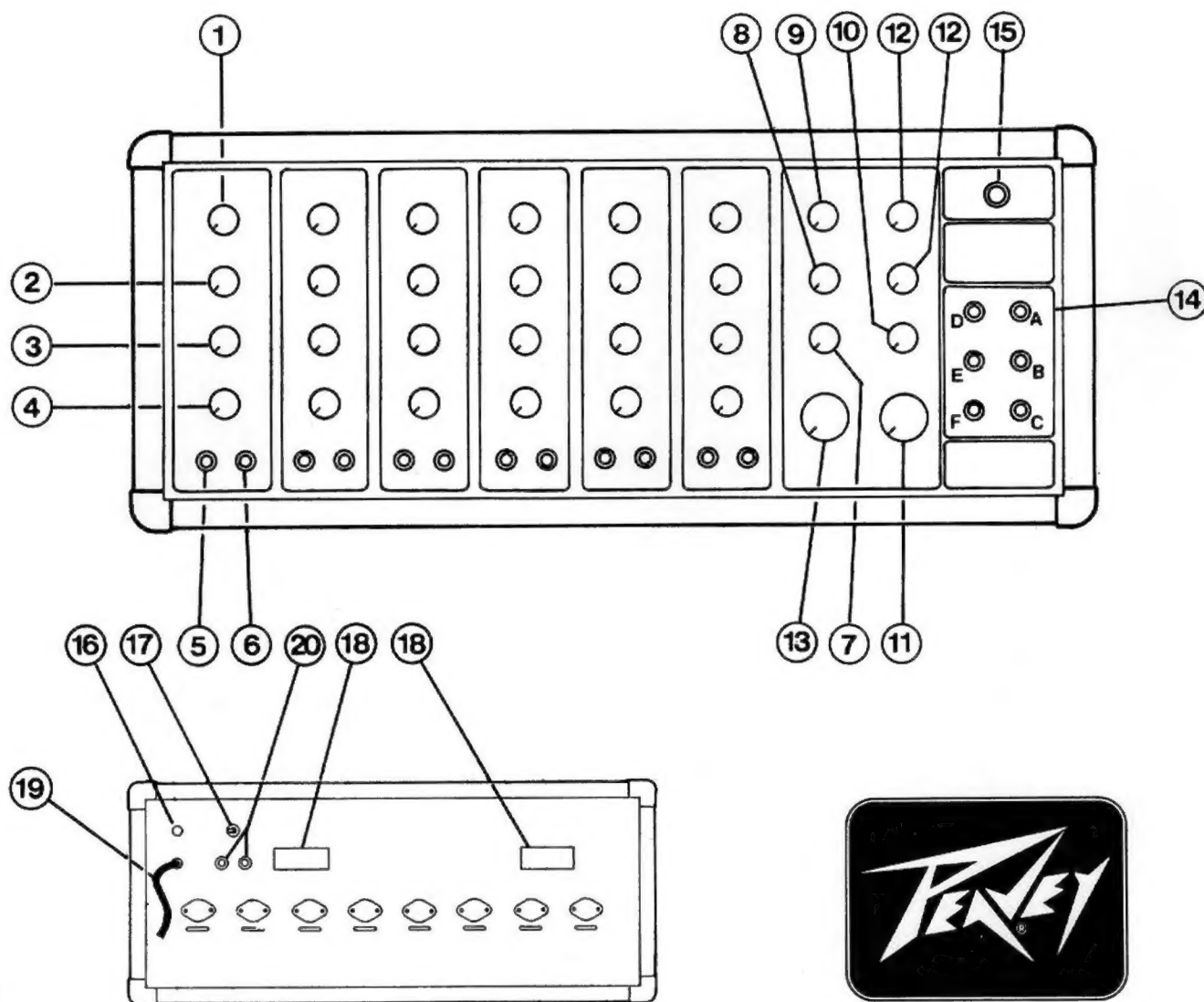
14a. The main output is the master line amplifier output for driving external mixers, power amplifiers, etc. The output level of the main output jack is two volts R.M.S. at approximately 5,000 ohms.

14b. The monitor output jack is the same signal as the main output jack and is used to drive an external monitor amplifier/speaker combination.

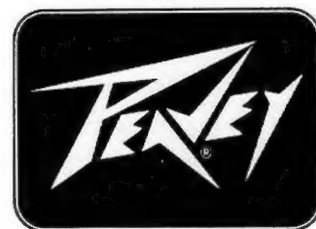
14c. The effects output is the connection from the effects mixing bus of the amplifier and its level is controlled by the effects level which is located on the front panel. The signal output is one volt R.M.S. @ 5,000 ohms.

14d. The auxiliary input provides for patching external signals directly into the main mixing bus. This feature is especially useful when "paralleling" two mixing consoles for more channels.

14e. The power amplifier input jack provides a method for patching the internal power amplifier into the other send busses of this or other consoles. This input is a switching jack that automatically switches the internal power amp to any signal plugged into it and away from the internal connection to the main output. This is especially useful for hooking up an external graphic equalizer unit, (ex:) patch from the main output jack on the amplifier to the graphic input and from the graphic equalizer output to the power amp input of the amplifier.



Back Panel



14f. The reverb footswitch jack provides a method for reverb cut off by use of the optional remote footswitch. Any footswitch with the proper plug (standard phone plug) and a shielded cable will work with this jack.

15. The pilot light indicates when power is applied to the amplifier.

16. The fuse is located within the cap of the fuse holder and should be replaced with one of the proper value if it should fail. It is necessary that the proper value fuse be used to avoid damage to the equipment and to avoid voiding the warranty. Models that have circuit breakers can be reset by depressing the red button. If the breaker trips repeatedly, take the unit to a qualified service center for inspection.

17. The line power switch is of the three position type with the center position being **off**. The three position switch has two **on** positions which are used to ground the amplifier properly. One of the on positions will yield and the least hum or popping when the microphone is touched and this is the position that should be used.

18. The large line cord retainers on the rear panel are provided for your convenience in storing the AC line cord during transport of the unit.

19. The three wire line cord has been provided for your protection and should be connected to the proper line voltage as indicated on the back pane. **DO NOT REMOVE GROUND PIN ON PLUG.**

20. The speaker output jacks are designed to be used with a total load of Two **OHMS**. Speaker systems of higher impedance can be used with a slight loss in output power. Speaker systems with less than a total of two ohms can be used with the risk of overloading the power amplifier. Slightly less power will be delivered to lower impedances because of the unique limiting action of our integral protection system. The power amplifier is built on a large aluminum heatsink to cool the output devices. A thermostat is connected to this heatsink to shut the system down in case of overheating. Low speaker impedances tend to cause the amp to run hotter than normal, and could cause the automatic cutoff to operate if the output stage becomes hot enough to endanger the output devices. The thermostat is self re-setting and normal operation will be restored when the unit reaches safe operating temperatures. If thermal shutdown is apparent then you are overloading the system and continued use in this manner will damage the system. Never use less than a one ohm total load on the 400 module. The output voltage available from this unit is approximately 20 VRMS into two ohms with proper line input.

CAUTION

To avoid damage to your equipment or electrical shock when using your PA-400 with other consoles or effects units, all signal connections should be completed with shielded cable before power (mains) connection is made. The three wire power receptacles should be used if possible.

All speaker cables must be unshielded!

I. POWER AMPLIFIER SECTION:

400 MODULE

A. Output Power @ 1 KHZ @ 117 VAC Line:

1. Rated Power: 200 W RMS @ Rated Load: 2 OHMS
2. Power vs. Distortion:

LOAD IMPEDANCE	8	4	2	1	OHMS
OUTPUT @ 1% THD	80	140	210	140	W
OUTPUT @ 5% THD	95	160	240	180	W

B. Peak Output @ Rated Load: 14 AMPS & 28 VOLTS, 400 WATTS

C. Music Power Output @ Rated Load: 290 WATTS RMS @ 1% THD

D. Frequency Response: 3 DB Down @ 50 HZ & 15 KHZ

E. Sensitivity @ Rated Power & Load: 700mV

F. Input Impedance: 10 K OHMS

II. PRE-AMPLIFIER SECTION:

A. Input Characteristics: (Tone Controls Flat, Volume @ Maximum, Master @ 12:00)

1. Sensitivity: 4 mV @ 1KHZ
2. Input Impedance: 130 K OHMS Unbalanced
3. Noise: 56 DB (Open CKT), 60 DB (50 K OHMS), 66 DB (Short Ckt)*

B. Distortion @ 1 KHZ @ Rated Output: Less Than 0.2% THD

C. Frequency Response: 3 DB Down @ 40 HZ & 20 KHZ

D. Tone Controls: \pm 15 DB @ 50 HZ & 5 KHZ

E. Reverb/Effects Send Control: Continuously Variable each channel

III. MASTER SECTION:

A. Tone Controls: \pm 15 DB @ 50 HZ, 800 HZ, 5 KHZ

B. Reverb Return Control: Continuously Variable with Foot-switch cut-off

C. Main/Monitor Output Level: 2.0 V RMS into 10 K OHMS

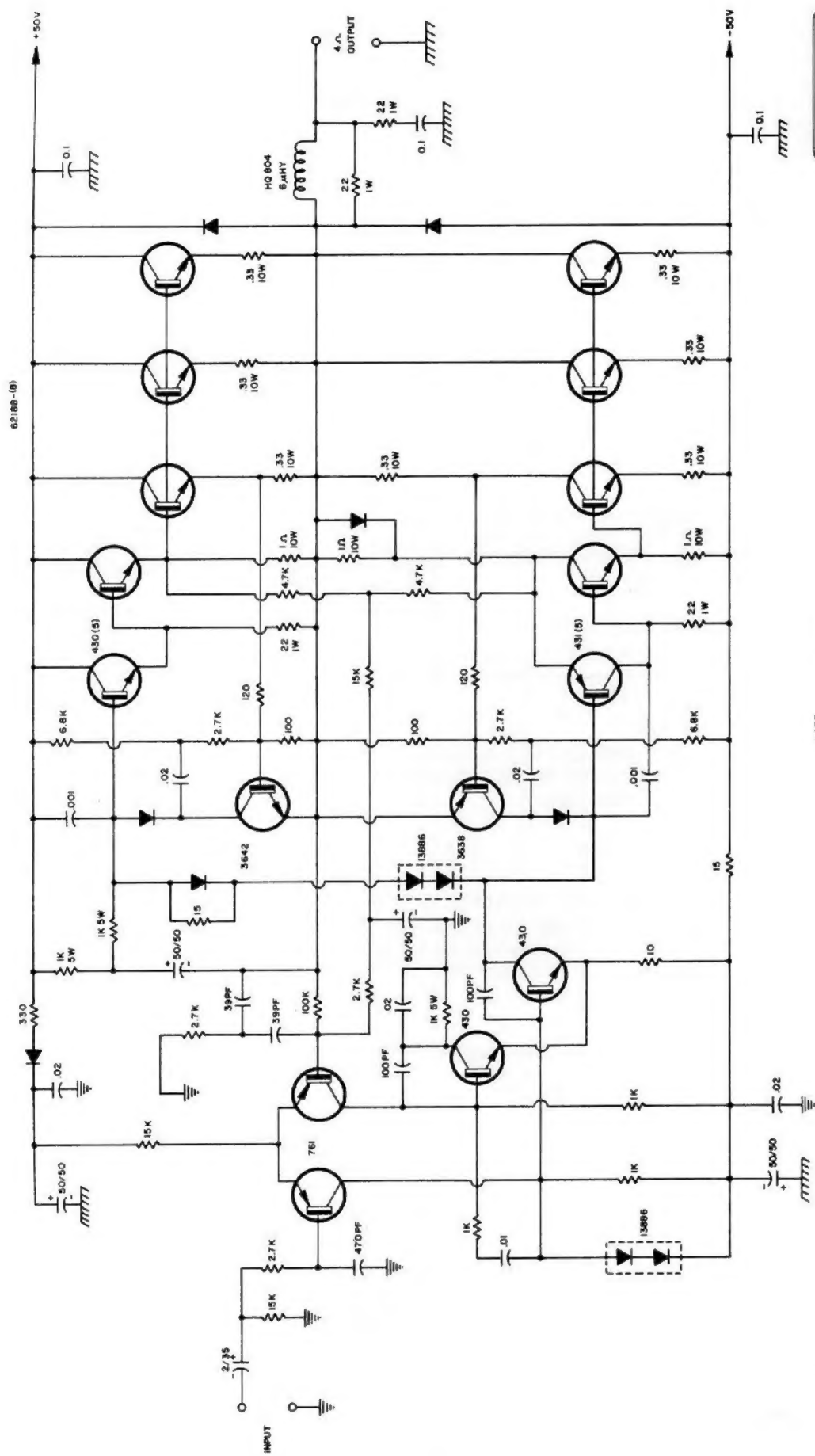
D. Effect Output Level: 1.0 V RMS into 10 K OHMS

E. Feedback Filters: Two Variable Frequency Notches

* Signal-to-noise ratio DB below rated output

Specifications and schematics published in this manual are subject to change without notice

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NOTE
ALL RESISTORS 1/2W UNLESS NOTED
ALL CAPACITORS IN MFD UNLESS NOTED
ALL DIODES 1A 200PIV UNLESS NOTED



400H MODULE

